

TITLE: STIMULATORY EFFECTS OF TOBACCO LEAF SURFACE CHEMICALS ON TOBACCO BUDWORM OVIPOSITION

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ABSTRACT: A cage bioassay was developed which tests the ovipositional preference of tobacco budworm moths on tobacco entries. Four potted plants of a test entry were placed in a cage opposite four plants of the budworm susceptible cultivar, NC 2326. Ten mated females were released into a cage, and eggs were counted the following morning. During 46 cage-nights in 1981, about 3 times as many eggs were deposited on NC 2326 as on TI 1112, which is budworm resistant in the field. Surface chemicals from NC 2326 leaves were removed by dipping them in methylene chloride. During 1981 tests, oviposition onto TI 1112 plants was stimulated when plants were sprayed with whole leaf washes (WLW) or the methanol-soluble fraction of WLW in an acetone carrier. The hexane-soluble fraction did not affect egg laying. In 1982 pure chemicals indigenous to green leaves of susceptible and resistant tobaccos (α - and β -4,8,13-duvatriene diols, corresponding mono-ols, cis-abienol, 15-OH abienol, and sucrose esters) were tested in a similar manner and will be discussed. Twenty-six entries were tested in the oviposition cages and their leaf surface chemical profiles obtained by gas chromatography. There was a strong positive correlation between $\log \alpha$ -4,8,13-duvatriene diol leaves ($\mu\text{g}/\text{cm}^2$) and budworm egg deposition. The significance of other surface chemicals will be discussed.

REVIEW: The study presented by Mr. Jackson of USDA was a systematic approach to determine if the surface chemicals on the leaves of susceptible and field resistant tobacco varieties were the determinants for budworm resistance. The selection of susceptible and resistant varieties as well as the development of a testing technique were presented. Basically the two varieties were selected from prior knowledge that the TI 1112 variety had shown field resistance whereas the NC 2326 variety had shown susceptibility to budworm infestation. The bioassay technique consisted of placing four plants of each variety in diagonal corners of a special greenhouse covered with nylon screen. A small 7-watt bulb was used for illumination. The deposited eggs were counted on the day after each release of mated females. A microscopic investigation revealed that the resistant variety had less exudate covering on the trichomes. During the course of the experiment, GC analysis of the washings and the spray-back of leaf washings on both varieties indicated that the waxes, especially C_{22} alcohol esters, were the predominant chemicals in the exudate on the susceptible variety. A further separation into hexane and methanol solubles indicated that the methanol portion increased the susceptibility of the otherwise resistant variety. These components were further investigated and identified as α and β duvatriene diols. Synthetically pure α and β diols were investigated separately and were both found to be active in producing sites for eggs. Various other mono-ols were investigated and found to be non-significant in producing sites. Investigation of labdanes are in progress at the present time. The overall summation indicated that the quantity as well as the composition of the leaf coverings may be the cause for susceptibility to the depositing of eggs by the budworm moth.

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